Annual Assessment Report

Department: Mathematics
Academic Year: 2016-2017
Date of Submission:
Department Chair: Ray Rosentrater

I. Response to the previous year PRC's recommendations

Item: However, which courses exactly are "calculus based" … is not clear.	**Response:** Calculus-based courses are MA-009, MA-010, and MA-019.
Item: [H]ow the implementation is being organized so broadly is not clear.	**Response:** We are not proposing a change in instruction so much as a conscious effort to name what is already taking place. We will remind ourselves of this goal and discuss the effectiveness of our "naming" once a month in the departmental meetings of fall 2017. In addition, we have adopted a text that includes many applications highlighting the use of data in calculus.
Item: If the QLRA does not capture the way a calculus-based method can improve quantitative reasoning and decision making then what would be a better instrument to use for assessment in these courses?	**Response:** The department has created a protocol for assessing core knowledge within the calculus sequence. See attached document.
Item:	**Response:**
Notes:	

II A. Program Learning Outcome (PLO) assessment

If your department participated in the ILO assessment you may use this section to report on your student learning in relation to the assessed ILO. The assessment data can be requested from the Dean of Curriculum and Educational Effectiveness.

Program Learning Outcome	**Communication.** Students will be able to communicate mathematical ideas following the standard conventions of writing or speaking in the discipline.
Who is in Charge /Involved?	Instructors in MA 20, MA 108, MA 110, and MA 180 will collect data. The chair will coordinate the process of evaluation and response.
Direct Assessment Methods	We assessed lower-division student writing by reviewing students' typeset work from the spring 2016 section of MA 020 and student postings on the spring 2017 MA 020 course wiki. In the 2016 class, one student (of seven) submitted work that was deficient. The remainder of the students submitted acceptable work with three students performing at an exceptional level. The spring 2017 section of MA 020 took a different approach to writing and papers of individual students were not available. However, comparison of work from the start and the end of the of the spring 2017 course showed marked improvement in student writing over the course of the term. Because of the collaborative nature of the writing in this section, it is not possible to tease out individual student performance, but it is clear from both sets of writing samples that the general level of writing is good for students at the lower-division level. We assessed upper-division writing by reviewing papers collected in MA 108. We had three writing samples from each of the eleven students in the course. One writing set was used for an inter-rater reliability exercise after which the remaining two papers were evaluated using the departmental writing rubric. Our rubric assesses writing in three areas: analysis, exposition, and format. All the papers were acceptable in exposition and format. Three were exceptional in exposition and over half were exceptional in format. There was a bit more trouble with analysis. Four students of the eleven were weak in this area. It is not surprising that students are weakest in this area since they are writing about newly-learned material and have not yet had the chance to become proficient in creating the related proofs. Indeed, it took some effort for members of the department with specialties in other areas to understand the proofs sufficiently well to assess them. Department members attended the session in which students in MA 108 (Problem Solving) presented their work. Faculty assessed the presentations using the departmental presentation rubric. Of the seven presentations, two were outstanding in all areas. Three presentations were delivered at an acceptable level. The areas in which the presentations could most be improved were organization and delivery. Two students gave deficient presentations. The major areas of weakness were organization, pacing, and audience engagement. Significantly, the two weak talks were given by students who had not had

	given a prior Problem Solving presentation. One students did not seem to take the task seriously. Comparing these students to those with more experience, it is clear that students are benefiting from instruction and practice.
Indirect Assessment Methods	Since the communication outcome expects students to communicate following the standard conventions of the discipline, the true test of success in this area comes from external sources. The following data provides evidence that our students are producing quality communications. 1. Two students gave talks at the section meetings of the Mathematical Association of America. 2. Five student presented posters at the same meeting. 3. Students submitted seven solutions to mathematical journals. For purposes of perspective, note that the 2017 graduating class contained three mathematics majors.
Major Findings	1. Students in the program are developing their communication skills and are competent communicators by the time they graduate. 2. Students' writing is strongest in terms of exposition and formatting skills and weakest in logic. The latter weakness may reflect unfamiliarity with the material. 3. Students who have been in the program longest have developed good oral presentation skills. Our better students are able to present at a professional level.
Closing the Loop Activities	1. We will continue to give focused attention to writing and oral presentation in selected upper and lower division classes. 2. We will monitor the two students who gave weak oral presentations to ensure that their presentation skills improve. They and other students will be encouraged to view the video *Technically Speaking* as an additional way to learn good presentation habits. 3. While it is important that students continue to write about materials that are new to them (that is how they best learn), we will consider using at least one writing task that involves material that they have already mastered earlier in the course when we next review the communication standard. The point would be to determine whether the weakness exhibited in the papers' logic was truly a result of unfamiliarity with the material or if something more serious is going on.

Collaboration and Communication

Two of the three current mathematics faculty contributed writing samples to be evaluated. All of the mathematics faculty reviewed the writing samples, discussed the quality of the writing, and how we should proceed from here. All members of the department participated in the evaluation of the oral presentations and all of the mathematics faculty discussed the implications and our responses to the results.

or/and

II B. Key Questions

Key Question	
Who is in Charge/Involved?	
Direct Assessment Methods	
Indirect Assessment Methods	
Major Findings	
Recommendations	
Collaboration and Communication	

III. Follow-ups

Program Learning Outcome or Key Question	How can we increase the applied offerings in our department while maintaining a solid set of courses needed for graduate-school-bound students?
Who was involved in implementation?	David Hunter offered a course in cryptography in the fall semester of 2016 and Austin Scirratt offered a topics class in mathematical modeling in the spring of 2017. Maria van der Walt will be offering an applied mathematics course in the spring of 2018, again as a topics class.

What was decided or addressed?	Given the response to the cryptography class, we will move this course into our regular course offerings.
How were the recommendations implemented?	A course proposal for cryptography has been submitted to the Review Committee of the Academic Senate.
Collaboration and Communication	

IV. Other assessment or Key Questions related projects

Project	
Who is in Charge /Involved?	
Major Findings	
Action	
Collaboration and Communication	

V. Adjustments to the Multi-year Assessment Plan (optional)

Proposed adjustment	Rationale	Timing

VI. Appendices

Rubric for scoring mathematical writing at program level (revised 1/2017)

I. Logic	*Deficient*	*Emerging*	*Outstanding*	*Score*
Deductions are sound and adequately justified.	Serious logical errors or the question is not adequately addressed.	Only minor logical errors or missing steps/explanations.	Complete justification free of logical errors.	
Appropriate use of definitions, terminology, and axioms.	Many improper applications.	Generally applies definitions and axioms correctly.	Consistently uses definitions and axioms correctly.	
.	*0*	*1*	*2*	*3*	*4*	*5*	.	
II. Exposition	*Deficient*	*Emerging*	*Outstanding*	*Score*
Writing is complete and economical.	Incomplete thoughts. Excessive wordiness. Irrelevant digressions. Confusing sentences or phrases.	Generally complete, clear, and concise. Few unneeded sentences or phrases. Mostly on point.	Always complete and concise. Clearly addresses the heart of the problem.	
Well organized with appropriate variation in sentence structure.	Disorganized, awkward, and/or repetitious.	Globally organized with only occasional awkward, misplaced, or repetitious sentences.	Well organized at all levels with clear sentences of varying structure.	
Proper use of prose.	Poor word choice. No connecting prose.	Generally adequate word choice. Missing some connecting prose.	Consistently good word choice. Good transitions.	
Spelling, grammar and punctuation.	Many errors.	Few errors.	No grammatical, punctuation, or spelling errors.	
Appropriate use of variable names and symbols.	Poor or inconsistent choices. Undefined variables.	Notation sometimes ambiguous or misleading.	Consistently good choices.	
.	*0*	*1*	*2*	*3*	.	
III. Formatting and Typesetting	*Deficient*	*Emerging*	*Outstanding*	*Score*
General layout.	Poor or inconsistent choices.	Generally appropriate choices.	Consistently good choices.	
Alignment and spacing.	No discernible alignment protocol.	Occasionally inconsistent or non-standard alignment or spacing errors.	Standard alignment and spacing used throughout.	
Formatting as mathematics.	No special formatting or poor or inconsistent choices.	Generally appropriate choices.	Consistently good choices.	
0	*1*	*2*	.	

COMMENTS:

Mathematics Presentation Rubric

Presenter: **Date:**

Criteria					Points
	1	**2**	**3**	**4**	
Content	The presentation contains serious logical errors. 0 1 2 3	Demonstrates lack of understanding of some of the mathematical concepts of the presentation. 4 5 6 7	The presentation has some missing steps or minor errors. 8 9 10 11	Demonstrates a complete and comprehensive understanding of the mathematical concepts. The work is justified and without error 12 13 14 15	
Organization	Audience cannot understand presentation because there is no sequence of information. 0	Audience has difficulty following the presentation because student jumps around. 1 2	Information is presented in a logical sequence that audience can follow. 3 4	Information is presented in a logical and interesting sequence with motivation. 5	
Visuals/ Examples	No visuals/examples 0	Visuals/examples are largely irrelevant or distracting. 1 2	Visuals/examples are related to the presentation but do not contribute significantly to audience understanding 3 4	Visuals/examples used supported audience understanding 5	
Delivery	Presenter mumbles, incorrectly pronounces terms, or speaks too quietly. Student is ill prepared. 0	Presenter incorrectly pronounces terms. Audience members have difficulty hearing. Back to class. Often too fast or too slow. 1 2	Presenter's voice is clear. Pronounces most words correctly. Generally, faces the class. Few pauses to check understanding. Sometimes too fast or slow. 3 4	Student engages the class with a clear voice and precise pronunciation of terms. Pauses appropriately. Well prepared. Good pace. 5	
Questions	Presenter is unable to respond to questions. 0	Presenter responds to questions, but the response is incorrect or off track. 1 2	The responses are correct but circuitous or confusing. 3 4	Responses are correct, clear, and to the point. 5	
				Total	

Comments: